AMENDMENTS TO THE SPECIFICATION

Page 4, replace second full paragraph with the following:

A second problem is that the refractive index can be changed by about 0.001 at maximum because, even if the ultraviolet laser rays are irradiated for a [linger] longer period of time, the laser rays having a power density not more than an abrasion threshold of a wave-guide material must be irradiated. Accordingly, the modification of the refractive index to a larger extent is quite difficult by means of the irradiation of the ultraviolet rays.

Page 11, after third full paragraph, insert the following:

Fig. 19 is a schematic sectional view showing an optical wave-guide having a convex surface.

Fig. 20 is a schematic view showing a wave-guide device including a planar slab wave-guide.

Page 29, replace second full paragraph with the following:

Example 3 is a concrete example of the method of modification described in claim 3. Fig.3 is a sectional view showing an optical wave-guide device including a core section 12 formed by doping a clad section of a silica glass substrate 11 with GeO_2. The section of the core is 7μm square. An optical path 20 for focused ultra short pulse laser rays 21 and a portion 15 of which a refractive index is modified are shown in the left-hand side of Fig.3.

Page 30, replace first full paragraph with the following:

The refractive index of only part of the core section could be changed, as shown in the central part of Fig.3, by using ultra short pulse laser rays 22 having a wavelength of 800 nm focused by using an objective lens of 100 magnifications. The permeation loss of the guided rays coming from the wave-guide was within 1 %, and the change of the refractive index per unit scanning distance was 0.0010/mm. These were about half the permeation loss and the refractive index change when entirely modified.

Page 31, replace first full paragraph with the following:

As shown in the right-hand side of Fig.3, since the laser rays were absorbed in the entire optical paths of the ultra short pulse laser rays permeating the optical wave-guide device and the energy could not be concentrated to the focused portion 24, the refractive index of the core section could not be changed.

Page 38, replace first full paragraph with the following:

In the present Example, in order to modify the refractive index of the optical wave-guide device of Example 1, laser rays 28 having a pulse width of 150 femto-seconds, pulse energy of 0.5μJ, a pulse repetition frequency of 1 kHz and a wavelength of 400 nm emitted from a Ti-sapphire laser were used.

Page 41, replace second full paragraph with the following:

A defection was generated in the vicinity of a hole when ultra short pulse laser rays focused by using an objective lens of 100 magnifications similarly to Example 8 were irradiated

to a core section of an optical wave-guide prepared by doping silica glass with GeO_2, and the result of the spectrum measurement revealed that, as shown in Fig.9, a further defective band 33 was generated in the band-gap [23] 32 of the core material.

Page 41, replace fourth full paragraph with the following:

However, after the change of the refractive index, when the optical wave-guide device was heated for one hour at 200 °C, the trapped electron was relaxed to a valence band 19. A relaxed electron 37 was shown in Fig.9.

Page 46, replace first full paragraph with the following:

The optical path lengths of each of the interferometers were adjusted such that rays having specified wavelengths were interfered by bonding optical fibers 45 to the input and output surfaces of the optical wave-guide device in advance and modifying the refractive index of the core section of each of the interferometers by using the apparatus 43 for modifying the refractive index [43].

Page 53, replace second full paragraph with the following:

The ray propagation loss of the optical wave-guide was measured to be 0.1 dB (about 2 %) or less after the optical fiber having a core size of 7μm was connected to a the refractive index modified portion [14] 15 acting as a spot size converting optical wave-guide 57.

Pages 53-54, replace paragraph bridging pages 53 and 54 with the following:

Fig.17 is a top plan view showing a T-shaped branched optical wave-guide device using grating 58 of holes in which a core section 12 of an optical wave-guide doped with GeO_2 is

formed in silica glass thin film 51 formed on a silicon substrate, and an enlarged perspective view shows a portion where a refractive index is modified.

Pages 55-56, replace paragraph bridging pages 55 and 56 with the following:

In an alternative Example, the core section for guiding the rays and doped with GeO_2 in the glass optical wave-guide device preferably includes a planar ~~slub~~ slab wave-guide which is subjected to the refractive index modification (see Fig. 20).

Page 56, replace fourth full paragraph with the following:

In a still further Example, the surface shape of the optical wave-guide irradiated with the laser rays is preferably convex to act as a lens to focus the irradiated rays to the core section of the laser wave-guide (see Fig. 19).